REMARKS

The Official Action objects to the abstract due to a semantic problem. The Abstract has now been amended in order to address the semantic problem and, as such, the objection to the Abstract is therefore overcome. The Official Action also objects to Claims 1-3 for various informalities. Each of these informalities has been addressed in the manner suggested by the Official Action with the exception of the informality identified in paragraph 8 of the Official Action which became moot in light of other amendments made to Claim 3. Based on the foregoing amendments, the objections to Claims 1-3 are therefore also submitted to have been overcome.

The Official Action rejected Claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over a dissertation prepared by Christoph Leser entitled *On Stationary and NonStationary Fatigue Load Modeling Using Autoregressive Moving Average (ARMA) Models* in view of U.S. Patent No. 4,030,208 to Fred F. Carver, et al. As described below, the claims are patentably distinct from the cited references, taken either individually or in combination. As such, the rejection of Claims 1-5 as being unpatentable over the Leser dissertation in view of the Carver '208 patent is therefore traversed. Based on the foregoing amendments and the following remarks, reconsideration of the present application and allowance of the claims are respectfully requested.

As set forth by independent claim 1, a method of simulating service loads includes: (A) developing a service load history database including multiple time series models representative of different service load conditions, (B) combining the multiple time series models, (C) adjusting a parameter of each of the time series models and creating an accelerated service load model, (D) regenerating random vibration load data based upon the accelerated service load model and (E) feeding the load data to a drive simulation system in order to cause the drive simulation system to simulate service loads in accordance with the random vibration load data.

By way of background and as described on pages 3 and 4 of the present application, time series models are developed that are representative of different service

loads. For example, page 4, lines 22-24 of the present application identifies exemplary service loads as those created by road surface fluctuations or fluctuations of wind pressures, *e.g.*, wind gusts. For each service load of interest, a time series model is developed and stored to permit future reconstruction of the service loads. For example, page 5, lines 8-11 of the present application notes that different time series models may be constructed to represent the service loads attributable to travel over a sand road, a concrete road, a soil road and an asphalt road. As set forth on page 3 of the present application, one common time series model is an autoregressive moving average (ARMA) model and another time series model is an AR(p) model.

Once the time series models have been developed, the time series models are combined as described on page 5, lines 4-11 of the present application. As noted on page 4, lines 5-8 of the present application, multiple times series models, each representative of a different service load, may be combined in different proportions with the proportion depending upon the estimated time during which the object under test will be subjected to the respective service load during its anticipated lifetime. For example, if a vehicle under test is anticipated to travel over asphalt roads for 80% of its life and over gravel for 20% of its life, the resulting combination of the time series models would weight the time series model representative of the service loads to which the vehicle is subjected while traveling over an asphalt road by 80% and the time series model representative of the service loads to which the vehicle are subjected while traveling over a gravel road by 20%.

In order to create an accelerated service load model, a parameter of each of the time series models is adjusted. As described further in dependent claim 3 and as similarly described by the present application, a parameter that is based upon the standard deviation σ_a of the distribution represented by the respective time series model may be changed to effectively accelerate the service load model. In this regard, the ARMA and AR models are described to represent normally independent distributions having a mean value of zero and a standard deviation of σ_a. *See* page 4, lines 7 and 8 of the present application. By changing the value of σ_a^2 in the resulting time series models, the resulting service load model is accelerated without altering the sequencing or the shape of

the autospectrum of the reconstructed signals. *See* page 5, lines 12-16 of the present application.

Thereafter, random vibration load data is regenerated based upon the accelerated service load model. As described on page 5, line 18 – page 6, line 5 of the present application, the random vibration load data may be generated in a recursive manner based upon a series of random data $a_1, a_2 \ldots$ with the random data being generated such that the mean of the random data is zero and the standard deviation of the random data is σ_a. The random vibration load data is then utilized to drive a simulation system, such as by converting the load data into digital signals (see Figure 2) that may then be utilized to "drive a computer-controlled actuator to simulate ground fluctuations, vibrations caused by propulsion systems, and/or vibrations caused by ocean waves, etc." *See* page 6, lines 8-10 of the present application.

With respect to the cited references, the Leser dissertation describes a method to model a fatigue load using an ARMA model. Notably, the Leser dissertation assumes that the service loads are maintained the same statistically and can be modeled using a single ARMA model throughout the entire operation cycle and/or the entire life cycle of a platform. As described by the Leser dissertation, the accuracy of the modeling is determined by the order of the ARMA model or the order of the AR model. *See* page 19 of the Leser dissertation with respect to the AR model and pages 64 and 65 of the Leser dissertation with respect to the ARMA model. Although the order of the model may vary, it is noted that the technique described by the Leser dissertation utilizes only a single ARMA or AR model for modeling of a fatigue load.

As described above, independent Claim 1 develops a service load history database that includes "multiple time series models representative of different service load conditions" and then combines the multiple time series models. By way of example with reference to an aircraft, different time series models may be developed to represent the periods of taking-off, cruising, landing and turning for which there are different service load conditions. By combining the multiple time series models representative of the different service load conditions, the resulting combination can form a realistic service load model over a life cycle, such as an aircraft life cycle. In contrast to the Leser

dissertation which discloses a modeling technique utilizing a single ARMA model or a single AR model having an order that is altered to control the accuracy of the resulting modeling, the method of independent Claim 1 utilizes multiple models, such as multiple ARMA models or multiple AR models, that are representative of different service load conditions and that are then combined together. Thus, the Leser dissertation fails to teach or suggest developing a service load history database that includes multiple time series models representative of different service load conditions and combining the multiple time series models, as set forth by independent Claim 1. The secondary reference, i.e., the Carver '208 patent, also fails to teach or suggest the inclusion of multiple time series models representative of different service load conditions and the combination of the multiple time series models and, indeed, the Carver '208 patent was not cited by the Official Action for this proposition.

As also described above, the method of independent Claim 1 further includes the adjustment of a parameter of each of the time series models to create an accelerated service load model such that random vibration load data can be regenerated based upon the accelerated service load model. By adjusting a parameter, such as the value of the variance σ_a as set forth by dependent Claim 3, a realistic acceleration rate can be derived and the equivalent real-life operation time of a platform, such as an aircraft, can be readily calculated after the platform has been tested for a certain period of time (generally much shorter than the actual lifetime of the platform) in the laboratory or the like. In contrast, the Leser dissertation does not teach or suggest the adjustment of a parameter of the time series models to create an accelerated service load model from which a random vibration load data can be regenerated. Indeed, the portions of the Leser dissertation, i.e., page 16, last paragraph and pages 64 and 65, cited for this proposition do not appear to have any relationship with respect to the adjustment of a parameter in each of a plurality of time series models to create an accelerated service load model from which random vibration load data may be regenerated. As such, the Leser dissertation additionally fails to teach or suggest adjusting a parameter of each of the time series models to create an accelerated service load model and regenerating random vibration load data based upon the accelerated service load model, as recited by independent Claim 1. The Carver '208

patent also fails to teach or suggest the adjustment of a parameter of each of the time series models to create an accelerated service load model and the regeneration of random vibration load data based upon the accelerated service load model and, indeed, the Carver '208 patent was not cited by the Official Action for this proposition.

For each of the foregoing reasons, the method of independent Claim 1 is not taught or suggested by the Leser dissertation, taken either individually or in combination with the Carver '208 patent. Dependent Claims 2-5 include each of the recitations of independent Claim 1 and, as a result, are patentably distinct from the cited references, taken either individually or in combination, for at least for the same reasons as described above in conjunction with independent Claim1. However, a number of the dependent claims include additional recitations that are also not taught or suggested by the cited references and which therefor provide additional bases of patentability.

By way of example, dependent Claim 2 further defines the step of developing a service load history database to include modeling of original random vibration service loads in different time series models. The Leser dissertation, such as on page 65 as noted by the Official Action, describes the modeling of a random signal with a different order of the ARMA model. As described above, the Leser dissertation therefore discloses the use of a single model having an order that can be varied to alter its accuracy, but does not teach or suggest the use of multiple time series models that model original random vibration service loads as set forth by dependent Claim 2. Similarly, the Carver '208 patent fails to teach or suggest the additional recitation set forth by dependent Claim 2 and, indeed, the Carver '208 patent was not cited for this proposition.

Further dependent Claim 3, as well as dependent Claims 4 and 5 which depend upon dependent Claim 3, further defines the step of adjusting a parameter of each of the time series models to include changing a value of a variance σ^2_a. In contrast, neither of the cited references teaches or suggests changing the variance σ^2_a in order to create an accelerated service load model as set forth by dependent Claim 3 and by, dependency, dependent Claims 4 and 5. As described above, the Leser dissertation fails to teach or suggest the adjustment of a parameter of each of the time series model to create an accelerated service load model and, as a result, also necessarily fails to teach or suggest

changing the variance σ^2_a, in order to create an accelerated service load model as set forth, directly or indirectly, by dependent Claims 3-5. Additionally, the Carver '208 patent fails to teach or suggest the additional recitation set forth by dependent Claim 3 and, indeed, the Carver '208 patent was not cited for this proposition.
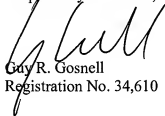
For each of the foregoing reasons, the rejection of the claims under 35 U.S.C. §103 is therefore overcome.

CONCLUSION

In view of the amendments to the claims and the abstract and the remarks presented above, it is respectfully submitted that all of the claims of the present application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

Guy R. Gosnell
Registration No. 34,610

Customer No. 000067141
ALSTON & BIRD LLP
Bank of America Plaza
101 South Tryon Street, Suite 4000
Charlotte, NC 28280-4000
Tel Charlotte Office (704) 444-1000
Fax Charlotte Office (704) 444-1111

ELECTRONICALLY FILED USING THE EFS-WEB ELECTRONIC FILING SYSTEM OF
THE UNITED STATES PATENT & TRADEMARK OFFICE ON October 30, 2008 by Gwen Frickhoeffer.

LEGAL02/31009488v1